SMART TWO+ SPECIFICATIONS

Supported Chemistries

Smart Batteries:

Lithium Ion, 14.4V maximum nominal

Nickel Cadmium / Nickel Metal Hydride, 12V maximum nominal

Dumb Batteries:

Nickel Cadmium / Nickel Metal Hydride, 7.2V to 12V nominal

Supported Battery Packs

15, 17, 30, 35, 36, 1020, 1030, 201, 202, 210, 2020 or equivalent

NOTE: Battery manufacturers use various designations in conjunction with the numbers listed above to identify their brand. The SMart Two+ Charger supports these batteries.

AC Power Supply
Auto-adjusting from 100 to 240VAC / 50-60Hz, 2A, 250V non-user replaceable fuse

Operating Temperature
0°C to 45°C (Recommended: 5°C to 30°C)

Approvals
CSA, UL, CE

Limited Warranty

Cadex Electronics Inc. warrants the SMart Two+ against defective materials and workmanship for one [1] year from the purchase date.

WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

DISCLAIMER

While every effort is made to ensure that the information contained in this guide is accurate and up-to-date, Cadex Electronics Inc. does not warrant or guarantee its accuracy. Further, Cadex makes no warranties, either expressed or implied, as to the merchantability or fitness for a particular purpose of the SMart Two+ Charger equipment. In no event will Cadex or its officers or employees be responsible for any consequential, incidental, or indirect damages (including damages for loss of business profits, business interruption, and the like) arising out of the use or inability to use the SMart Two+ Charger equipment and/or its documentation.

[ISO 9001 CERTIFIED]

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SMart Two+
Battery Charger
User's Guide

Components

The SMart Two⁺ package includes:

- 1 — SMart Two⁺ Charger
- 1 — AC Power Cord
- 1 — User's Guide
- 1 — Two Battery Bay Spacers

Description

The SMart Two⁺ is a Level 3 Charger[1] for SMBus Smart and standard batteries.

Operation and User Interface

The SMart Two⁺ is an automated charger. The presence of the batteries is automatically detected and charging is initiated as needed. Four LED's are used to display activity status for each charging station. All LED's flash once when the charger is powered up.

Quick Start

1. **Attach the power cord to the back of the charger, then insert the AC plug to a wall outlet.**

2. **Select the Target Capacity.** Use 80% if you are not sure which setting is best.

3. **Insert the battery into a charging bay to begin charging.** LEDs will light up. Refer to the LED Indicator Codes chart for details.

4. **If the Amber LED flashes, press the Conditioning button** (for the charging bay) to condition the battery. *IMPORTANT: CONDITION is a charge-discharge-charge cycle that may take up to fifteen (15) hours.*

5. **When the green LED lights up, the battery is fully charged.** Remove the battery.

Target Capacity

Capacity is the amount of electrical energy (charge) a rechargeable battery can hold. As it ages, a battery's capacity declines. The SMart Two+ reads the data stored in an SMBus battery to assess the capacity reached on its last charge and compares it with the selected *Target Capacity*. The *Target Capacity* switch located on the right side of the charger selects 60%, 70% or 80% target capacity. When measured capacity falls below target capacity, the amber LED indicator flashes, which suggests a need for *conditioning*. (See section below.)

A setting of 80% ensures that all batteries are charged to 80% capacity or higher -- this is a high level of performance and consistency. Lower setting will pass more batteries without the need for conditioning, but at the expense of a wider variance in performance from battery to battery. *NOTE: The battery is charged to the full extent that it can be charged, regardless of Target Capacity setting.*

Conditioning

Conditioning is a special cycle on the SMart Two⁺ that can rejuvenate an SMBus battery's capacity. Conditioning also calibrates the fuel gauge on an SMBus battery to provide a more accurate reading. The effectiveness of conditioning is dependent on battery age and cycle life (number of times the battery can be charged and discharged before it is depleted permanently).

[1] Level 3 of *Smart Battery Charger Specification*, Rev 1.0 of June 27, 1996 defined by Duracell Inc. and Intel Corp.

To condition a battery, press the condition button while the amber LED is flashing. If the battery capacity reaches or exceeds target capacity after conditioning, the green READY light illuminates.

If the red and amber LEDs come on after conditioning, the battery is probably too worn out to reach the target capacity. The charger can be forced into conditioning an SMBus battery by pressing the condition button while the yellow LED is flashing, just after battery insertion.

LED Indicator Codes

LED	STATUS	INDICATION: *ACTION*
All	off	No battery present.
Yellow (RUN)	on	Battery detected / charging.
	flashing	Smart battery detected (8 to 16 seconds).
Green (READY)	on	Battery charge completed.
	flashing	"Dumb" Battery charge completed.
Red (FAIL)	on	Battery fault: *Remove and reinsert battery; if Red LED remains on, the battery is probably defective.*
	flashing	Charger fault or overheat: *Remove battery from charger.*
Amber (CONDITION*)	on	Conditioning in progress.
	flashing	Target Capacity not met: *Condition battery by pressing CONDITION* button.*
Green & Amber	flashing	Finished charging, Target Capacity not met: *Condition battery by pressing CONDITION* button.*
Red & Amber	on	Finished conditioning, Target Capacity not met: *Retire battery.*

*NOTE: Conditioning is a charge-discharge-charge cycle that may take up to fifteen hours.

Caution!

- Do not block ventilation slots on the front and back panels of the charger.
- Charge only supported chemistries and battery packs listed on the back.
- Keep away from moisture. Clean only with dry or slightly damp lint-free cloth.
- Do not remove cover. The charger is not user serviceable.
- Air conditioning is recommended in the event of high ambient temperature.